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Rethinking the relationship between pedagogy, technology and learning in health and physical education

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Abstract: This paper seeks to address two key questions: 1) how could a pedagogically-driven approach to the use of DigiTech in HPE benefit young people's learning; and 2) what steps are required to develop new DigiTech pedagogies? The paper is a response to the largely pessimistic views presented in this journal by Gard, Lupton and Williamson about the role of technology in Health and physical Education (HPE). In this paper, we argue that while we need to be aware of the risks, we also need to explore the opportunities for digital technologies (DigiTech) to shape HPE in new and positive ways. Specifically, we argue that a focus on pedagogy is largely missing from earlier discussions. In mapping the evidence base on DigiTech against a three dimensional categorization of pedagogy – in the form of learners and learning, teachers and teaching, and knowledge and context (Armour, 2011) – we are able to demonstrate the value of a pedagogically-informed debate on this topic. The paper concludes by arguing for a 'profession-wide' debate to co-construct, trial and evaluate new ways in which we should – and should not – use DigiTech to optimise young people's learning in HPE.

Key Words: Digital Technology, Pedagogy, Emerging Technologies, Emerging Practices, Digital Learning

> The use of technology in education should now be seen as a significant issue for everyone with a stake in education
>
> (Selwyn, 2014, p. 1)

The deployment of digital technology (henceforth called DigiTech) to support learning has grown exponentially in recent years. This has led to increased critical scrutiny in a number of subject areas and from different disciplinary perspectives. In this context, it has been argued that developing a critically informed view of DigiTech in education is particularly important given the prevalence of impassioned, enthusiastic and, in the words of Neil Selwyn (2015, p. X), "bullshit" talk that has grown around it. The physical education (or, for the purposes of this paper, Health and Physical Education (HPE)) community has also engaged in these debates. The leading journal *Sport, Education and Society,* for example, recently devoted space for a discussion about the future of technology in HPE. In particular, Michael Gard, Deborah Lupton and Ben Williamson have raised new, if somewhat pessimistic, questions in this discursive space and these have provided one of the conceptual platforms for this paper. Drawing upon contemporary literature and our own recent work on this topic, the purpose of this paper is to rethink the links between pedagogy, technology and education. Specifically, while acknowledging the power and importance of the largely negative and alarmist views that have prevailed in our academic literature to date, we offer a different view that considers the value that a pedagogically-driven approach to the use of DigiTech in HPE could offer to support young people's learning in a digital age.

This paper is organized into three sections to address two key questions: 1) *how could a pedagogically-driven approach to the use of DigiTech in HPE benefit*

young people's learning; and 2) *what steps are required to develop new DigiTech pedagogies?* First, we provide a brief overview of Gard, Lupton and Williamson's arguments. Second, drawing on existing knowledge, we consider the relationship between DigiTech and pedagogy using a three dimensional categorisation of pedagogy. Third we make the case for the potential benefits of building new links between DigiTech and pedagogy in HPE and consider the 'what next?' question. In particular, we seek to mobilise the HPE profession, including both practitioners and researchers, to engage in a 'profession-wide' debate to co-construct, trial and evaluate new ways in which we should – and should not – use DigiTech to optimise young people's learning in HPE.

1. Gard, Lupton and Williamson – an overview

Gard (2014) introduced the concept of 'eHPE', which he defined as HPE's "ongoing investment in public health" and "digital technology" (p.828). Gard's argument about DigiTech is grounded in his longstanding critique of the presumed link between physical education and health, and the subsequent claims HPE scholars have made about the role DigiTech will play in helping HPE improve health (c.f. McKenzie and Lounsbery, 2013). Gard (2014) claims that DigiTech will intensify negative discourses of and related practices in "measurability, accountability, performativity and standardization" (p. 833). As a result, Gard argued that HPE will promote "the punitive, judgemental, time-consuming, intellectually arid and potentially unhealthy surveillance of [young people's] bodies and behaviour" (p. 835). HPE, in Gard's view, will be forced into a world that thinks "being healthy is a simple matter of being told, adopting and repeating a set of easily describe behaviours" (p. 839). Consequently, Gard (2014) suggested that "flesh and blood teachers" (p. 831) are at

risk of being replaced by health-related DigiTech. In other words, the perceived capabilities of DigiTech could further endorse societal, economic and politically supported discourses of performativity in education (see Evans, 2013; Apple, 2007), meaning that teachers no longer have their traditional role in promoting physical activity and health.

Similar to Gard, Lupton (2015) was pessimistic about the role of teachers in HPE as a result of the growth of DigiTech in education. Lupton (2015), however, was particularly concerned about the dangers of DigiTech leading to a whole school approach to data-led surveillance of each individual child. Lupton (2015, p. 126) suggested that the proliferation of health promotion and fitness apps and self-tracking devices means that it is only a matter of time before "the ethos and practices of self-responsibility" come to represent "key forces in behaviour change" for young people in HPE. Drawing on her own typology of five modes of self-tracking (see Lupton, 2014), Lupton (2015) challenged the reader to consider how long it will be before 'private' self-tracking becomes 'communal' (i.e. in a class), 'pushed' (i.e. teacher initiated), 'imposed' (i.e. health interventions), and 'exploited' (i.e. used for the purposes of others). Consequently, Lupton (2015, p. 127) posed a controversial question about the likelihood of reaching a situation where "students are forced to wear heart-rate monitors to demonstrate that they are conforming to the exertions demanded of them by the HPE teacher?" Nevertheless, it is also possible to argue for another more positive way of viewing this issue. Other subject areas in the school curriculum, including Maths, English and Science, are making extensive use of learners' data to drive more personalised forms of learning (see Apple, 2007). Perhaps it is possible to argue for new pedagogically-appropriate futures for HPE based on the use of individuals' health and fitness data? We will return to this issue later.

Williamson (2015) was similarly pessimistic about the proliferation of DigiTech in education, arguing that wearable technologies[1] will eventually control and govern the educational process. In this scenario, Williamson (2015, p. 135) claimed that HPE could become a site where the use of existing DigiTech such as "fitness testing, movement analysis software, kinetic videogaming and digital pedometers" (Williamson, 2015, p. 135) will be replaced by an "algorithmic skin" (p.133). This skin was defined as "an artificial informational membrane that continually interacts with, and is activated by, a densely coded informational environment" (ibid, p. 148). As a result, Williamson predicted that commercially produced DigiTech will begin to govern the educational process because of its capabilities to produce 'evidence-based' results. Here again, however, a counter view might be that – at the very least - such results are based on real rather than proxy and rather unreliable or self-reporting evidence. Through an algorithmic skin teachers could access new forms of evidence about young people's physical activity levels. Comparably to Sandaña (2014, p.4) we might argue that such "data is a gift, so be thankful when it is given to you".

In summary, Gard, Lupton and Williamson have outlined ways in which a data-driven society - exaggerated by the use of DigiTech– could lead to levels of body surveillance that are unintended, unimagined and/or untested. This is a future for HPE that seems to bypass teachers. In other words, DigiTech could ultimately deprive teachers of the opportunity and capability to teach. Yet, how realistic – or indeed unduly pessimistic - are these dystopian views?

The three authors made little attempt to ground their arguments in the evidence base on (i) what kinds of DigiTech young people and their teachers use

[1] Wearable technologies are variously described as "self-tracking, personal informatics, personal analytics or technologies of the 'quantified self'" (Williamson, 2015, p. 134).

currently in and beyond formal HPE settings; (ii) teachers' and young people's contemporary views on DigiTech; and (iii) the pedagogical implications of the wider physical, social, and economic architectures of schools and classrooms that support technology-mediated teaching and learning. In other words, it seems that what is missing in their arguments is a focus on the potential for new pedagogies of DigiTech; for example, current or imagined links between pedagogy and DigiTech that could work to enhance or even 'accelerate' (Fullan, 2013a) young people's learning in HPE. In the next section, therefore, we use a three dimensional concept of pedagogy as a framework for addressing our first question: *how could a pedagogically-driven approach to the use of DigiTech in HPE benefit young people's learning?*

2. The pedagogies of DigiTech in HPE

Pedagogy is a complex and slippery concept with a range of definitions (see Dron, 2014). Nonetheless, a widely adopted conceptualisation in physical education and sport pedagogy is that pedagogy is the connection between three dimensions, (i) learners and their learning, (ii) teachers and their teaching and (iii) knowledge in context (Armour, 2011; Quennerstedt et al., 2016). As Armour (2011, p.14) put it: "the key point to grasp about any pedagogical encounter between teacher/coach and young learner is that all three dimensions of pedagogy are present and interacting". In this categorisation of pedagogy, the learners/learning dimension "foregrounds children and young people as diverse learners and the ways in which they can be supported to learn effectively" (*Ibid*, 2011, p.13); the teachers/teaching dimension positions teachers as lifelong learners "who continuously and critically reflect upon their personal capabilities to meet the needs of young learners" (*ibid*, p.14); while

knowledge/context refers to the value that is placed on what is selected to be taught or learnt and the contingent contextual factors. But, how does a focus on the three dimensions of pedagogy shed new light on the potential of DigiTech to support learning in and beyond HPE?

Learners and learning

In 2016, teachers and other educators are faced with a generation of young learners who identify with selfies, hashtags, and emojis, and who see sharing, liking, tweeting, blogging and vlogging as everyday practices (Rich & Miah, 2014; Selwyn & Stirling, 2016; Tom, 2012). Digital devices, applications (apps[2]) and social networking sites are readily accessible and are used by many young people on a daily basis (Greenhow & Lewin, 2016; Lenhart, 2015). It has been estimated, for example, that 71% of American adolescents use the social networking site 'Facebook' as a platform for communication (Lenhart, 2015). This use of social media by adolescents is, perhaps, unsurprising given that:

i) Children begin web 'surfing' and accessing social media from as young as age four (Taranto et al., 2011);
ii) Young people are being deliberately targeted as consumers of DigiTech (Williamson, 2015; Öhman et al., 2014); and
iii) DigiTech is accessible to a wide range of youth in diverse socio-economic contexts (Greenhow & Lewin, 2016).

The seemingly unstoppable growth in young people's engagement with DigiTech in their personal lives (Rosen, 2010; Selwyn & Stirling, 2016) means that these technologies are socially and culturally relevant. Although, as Rosen (2010) suggests, the social relevance of DigiTech could act as a type of leverage to engage young

[2]An application programme is a computer programme designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user

people in learning, there are significant risks to young learners and on this point we agree with the arguments of Gard, Lupton and Williamson.

Health-related - extending to medical - DigiTech has the potential to have a profound positive or negative impact on young people's learning about health, physical activity and the body, both within and outside of formal education experiences. On the negative side of the argument, the social construction of particular body ideals is evident in the popular practice of taking and posting 'selfies' (Miguel, 2016; Warfield et al., 2016). Extending 'old media', selfies exaggerate the self-presentation of filtered, gendered, ideal and 'perfect' bodies because they are socially constructed, actualized and re-enforced through online networks (Warfield et al., 2016). This is a particular concern when a connection is made between the images presented and shared in selfies and presumptions made about 'health' (see, for example, healthyselfies.org) and, what we might term, *un-healthy* selfies. Further illuminating the concerns raised about 'teen magazines' and 'size 0' discourses (Kerner, 2013), there is evidence that young people are using selfies as a communication mechanism through which to engage with specific groups and that this acts to reinforce un-healthy discourses and behaviours (see #thinkspiration on Twitter as an example). What we can conclude from these examples is that the rise of 'healthism' (an ideological, neo-liberal and public construct of health) in adults, and concerns about individual autonomy, self-monitoring and obsession/addiction seen in social media (Lupton, 2015) are also growing concerns for youth (Rich & Miah, 2014).

Further risks arise from the extensive digital footprints that young people are creating and, as is the case of in HPE, the digital footprints teachers might be encouraging young people to create. Halford (2016), for example, raised questions

about what is considered public or private on social media sites. In challenging what might be considered 'private', Halford (2016) suggested that a person, a company or even the host site (e.g. Facebook) are able to access the digital data, regardless of privacy protection plans, guidelines, and regulations. The HPE profession must consider, therefore, whether digital images, and personal data about the body and/or a child's health generated in HPE lessons could and should be accessible to others outside of the education content.

Yet, there is another way of looking at learners and learning and DigiTech in HPE. For example, as seen in other educational contexts (see Greenhow & Lewin, 2016), there is significant potential for teachers to connect young people's uses of DigiTech with their learning experiences in HPE. Indeed, because DigiTech already provides an accessible and potentially rich resource for learning about health, physical activity and the body, it could also provide a useful resource for teachers to construct and deliver forms of knowledge to young people in ways that are engaging, immediate and attractive (Casey, Goodyear & Armour, 2016). Calls from political, research and practice fields certainly seem to support such a view, highlighting the urgent need to understand how technologies can support young people's learning in optimal ways (Fullan, 2013a; DCMS, 2015; UNESCO, 2015; Kong et al., 2014). It is certainly safe to assume that DigiTech will influence young people's learning about physical activity and health regardless of the position a teacher takes on the matter. There is clearly a need, therefore, for further critical, informed and profession-wide debate around the rise of 'healthism' and the ethical issues of DigiTech and what this means for learners and their learning. In line with Gard, Lupton and Williamson, we agree that it is unacceptable to 'glorify' the capacity of DigiTech to educate, and yet to be unaware (or plead ignorance) of the implications; for example, the ethical

challenges posed by public data. The prevalence of DigiTech in the lives of young people, however, means that teachers cannot simply ignore the dangers whilst simultaneously grasping the opportunities of DigiTech. So what is the evidence on teachers' views on and uses of DigiTech in HPE?

Teachers and teaching

Any debate about the role of DigiTech in HPE must have a focus on the role of teachers given the arguments that teachers have the greatest impact on students and their learning (Hargreaves & Fullan, 2012; Hattie, 2012, 2009). When compared to, for example, the school context, parents, home, resources, or the quality of a school's leadership, it is consistently argued that teachers are highly influential (Apple, 2007) and should be placed at the forefront of reform efforts to improve education (Hargreaves & Fullan, 2012; Hattie, 2012, 2009). Clark (1995, p.3), for example, argued that "teachers are the human point of contact with students. All other influences on the quality of education are mediated by who the teacher is and what the teacher does". Developing a knowledge-base about what teachers learn, do and practise is, therefore, vital for the creation of effective and contemporary policies, programmes and practices (Cordingly et al., 2015; Hattie, 2009). Yet, what teachers think, say, and do with DigiTech has received rather little consideration.

While DigiTech is celebrated for its "astounding and abounding creativity" (Fullan, 2013a, p.36), it has been argued that innovation in its use in education has stagnated (Apple, 2006; Robinson, 2011). Few teachers are able to incorporate DigiTech into the pedagogical context in purposeful ways that extend pedagogical capacity (see Fullan, 2013a). While there is much talk about how the latest 'gizmos and gadgets' could leverage young people's learning (Rosen, 2010), and the ways in which 'big' edu-businesses are focussed on designing and marketing educational

DigiTech to 'transform' teaching and learning (Enright et al., 2016; Gard, 2014; Lupton, 2015; Williamson, 2015), technology-mediated teaching and/or learning is not a mainstream practice. Indeed, Fullan (2013a) among others (c.f. Hastie et al., 2010; Palao et al., 2015; Selwyn, 2015), has argued that the use of DigiTech in schools is "conspicuous by its absence or by its superficial, *ad hoc* use" (p.13). Vrasidas (2014), similarly, reported that only 35% of teachers use DigiTech in the classroom, while Sipilä (2013) demonstrated that almost half of teachers feel under-prepared to use DigiTech to support learning. In the context of HPE, Kretchmann's (2015) small-scale study in Germany indicated that half of teachers surveyed felt they had enough experience to integrate DigiTech into HPE. Yet more than 80% of teachers suggested that they did not have enough pedagogical knowledge and experience of how integrate DigiTech effectively and that they wanted access to more pedagogical scenarios that exemplified DigiTech use in HPE. Indeed, most teachers expressed a preference for traditional technology (i.e. images and blackboards), rather than, for example, more recent collaborative, user-focussed, and interactive technologies, such as social media, apps, and 'mobile' devices.

The evidence-base on teachers, therefore, seems to suggest that while young people are active users and consumers of DigiTech, teachers are resistant and they struggle to integrate DigiTech in pedagogically sound or innovative ways. The literature suggests that large numbers of teachers are either resistant or even 'Luddite' in this regard. Drawing on the work of Webster and Robins (1986) and Bromley (1998), Reid (2009) explored the usefulness of employing a Luddite analysis to generate an understanding of resistance to technology in education. Reid (2009, p.

290) suggested that Luddism[3] was not a fight against technology *per se* but one against "a particular kind of political economy and ideology…[which] changed the traditional patterns of social life". Reid argued firstly that Luddism served as a refusal to isolate technology from social relations, and secondly that technological change presented a threat to a particular kind of life. Common populist terms used today to describe opposition or resistance to technologies or technological change include 'technophobe', 'non-techie', 'dinosaur', 'fossil' and 'diehard'. The 'Luddite' question arises, therefore: "what changes to the traditional patterns of social life are these modern day Luddites raging against?"

It could be argued that, much like most existing continuing professional development (CPD) experiences (Cordingly et al., 2015), the CPD mechanisms to support teachers in using DigiTech in new and pedagogically appropriate ways has been either absent or ineffective. As a result, DigiTech use is driven by so called 'early-adopters'; innovative, passionate and enthusiastic teachers who are inspired by their personal interest in technologies and their belief that DigiTech can enhance young people's learning (Casey et al., 2016). The lack of high quality CPD is a problem for these early adopters (lack of critical challenge) as much as it is for the wider Luddite teacher population (lack of knowledge and confidence). Equally, and as we will discuss in the next section, school and classroom contexts are not always conducive to DigiTech use. A lack of support within the local context has long been regarded as a powerful mediating factor in inhibiting teachers' attempts to change, learn and develop (Fullan, 2015) either with or without CPD mechanisms in place. Perhaps the most effective form of CPD in HPE we could imagine would be where early adopters and Luddites were able to work together within a three-dimensional

[3] A member of any of the various bands of workers in England (1811-16) organized to destroy manufacturing machinery under the belief that its use diminished employment. (Dictionary.com)

critical, pedagogical and analytical framework. The ambition would be to support both groups to challenge the views of the other, from the starting point that neither is inherently 'correct'. This type of CPD activity is aligned with the concept of 'effective' CPD as proposed by Armour, Quennerstedt, Chambers and Makopoulou (2015) who argued for CPD that allows teachers to focus on complexity, addresses contemporary challenges, bridges research and practice, and nurtures their career-long growth as learners. Yet, as numerous PE-CPD studies have reported (see Parker & Patton, in press) few such opportunities are available. It is difficult to imagine, therefore, how HPE teachers (early adopters and Luddites alike) can currently have the kinds of structured discussions that would support them to use DigiTech in pedagogically sound ways.

Knowledge in Context

In education systems, the "knowledge to be taught, coached or learnt is always a context-bound decision that reflects, reinforces, reproduces (and sometimes challenges) what powerful individuals or groups believes is valuable at any given time" (Armour, 2011, p.13). Considering this point in the case of DigiTech in HPE raises a host of interesting questions about who is driving what. For example, the wider societal context is one where there is an easy of access to mobile health apps; indeed Lupton (2015) puts the figure at over 100,000 such apps available on major app stores and this number is rising all the time. Meanwhile, in HPE, there is a close alignment between the leading HPE physical activity/health discourses (see Gard, 2014) suggesting that DigiTech is already driving forms of knowledge that arise in our HPE curricula on health and fitness. Yet, the implications of this trend appear not to have been recognised in formal education policy (see DCMS, 2015 as an example). Moreover, within the local context of schools and teachers' classrooms, there is little

evidence of radical change and innovation driven by technology tools or devices. We do acknowledge that change has occurred i.e. in the expectations that teachers use technologies to provide further understanding of 'learning' in HPE and in the introduction and sustained use of DigiTech such as games analysis, Heart Rate Monitors, pedometers, apps in phones etc. That said, there is evidence to suggest that schools and teachers continue to value traditional sports skills and games (Kirk, 2010) or, in Nordic countries, dance/gymnastics and outdoor activities (Quennerstedt, 2008). Meanwhile, young people are living in a parallel world of DigiTech that promotes views on health and fitness that sometimes accord with – and also challenge – our traditional practices in HPE.

At the policy level, the contemporary National Curriculum and Standards operating in a number of countries agree that as a result of a highly effective PE programme, all pupils should be able to lead what they term ‘healthy’ or ‘health-enhancing’ lives. Yet, the small number of available analyses on the use of DigiTech in HPE suggests that the forms of knowledge promoted tend to reinforce historical knowledge patterns. For example, DigiTech has been used to promote knowledge about skills and games (see Sinelnikov, 2013) and dance (Öhman et al., 2014). While it has been argued that new models, methods and ‘innovative’ pedagogical strategies should shift learning away from a focus on specific activities in HPE (O’Sullivan, 2013), teachers’ personal philosophies, training, and the school context all seem to act to reproduce the traditional activity focus (Kirk, 2010).

The pedagogical questions to be asked at this stage, therefore, are about the power of the context to adapt to, adopt or even shape new forms of knowledge that may or may not be positive. There is no doubt that DigiTech is opening up new possibilities and spaces in and through which to learn. If these spaces, however,

continue to be constrained by data reporting, limited curriculum opportunities and traditional practices and outcomes, then the best result we can hope to achieve is slightly better solutions to the same problems (Robinson, 2011). Moreover, if teachers are unsupported by appropriate forms of CPD, they will either use DigiTech in essentially uncritical ways that are more informed by technology than pedagogy, or avoid it (Howard & Mozejko, 2015). DigiTech is, after all, only as "good as the pedagogical methods it employs" (Ferster, 2014, p. 176).

Summary

Thus far, we have articulated an apparent disconnect between the debates on the use of DigiTech in education, and questions about pedagogy. Specifically, we have raised concerns about young people's learning on health through DigiTech *outside* of the school context and the implications for teachers and teaching *within* the school context. We have echoed some of the pessimistic views of Gard, Lupton, and Williamson, while also suggesting that there might be alternative readings of the future of DigiTech in HPE.

In the next section, we challenge ourselves and the wider HPE profession to think differently about DigiTech in HPE and we answer our second question: *what steps are required to develop new DigiTech pedagogies?* We argue that we need to focus on a complex, multi-layered understanding of pedagogy; i.e. in those places where learning, teaching and context converge- to consider what might be possible for DigiTech in HPE. In other words, as a profession, we argue for the need to engage in 'blue skies' thinking and critical yet constructive dialogue to imagine new futures for HPE and the development of new - pedagogies supported by DigiTech - in driving radical change.

Section three: 3. What steps are required to develop new DigiTech pedagogies?

As the papers in Sport, Education and Society show, DigiTech in HPE is becoming an important facet of the wider discussions in our field. Yet, the works of Gard, Lupton and Williamson illustrate a curious lack of discussion about the role of *pedagogy* in the analyses of the role of DigiTech in HPE. In our recent book (see Casey et al., 2016) we set out to address this gap. The original aim was to consider a concept that Casey (2014) had identified as 'pedagogies of technology' in HPE, as exemplified in thirteen pedagogical cases (Armour 2014) of teachers and their uses of DigiTech. The concept of pedagogies of technology was explained as follows:

> Pedagogies of technology are critically aware and technically competent pedagogies that can be developed in practice to maximise the latent potential of technologies to accelerate learning in meaningful ways that meet the individual needs of diverse learners. The starting point for a pedagogy of technology is a desire to do things differently, rather than to do the same things using 'flashy' tools and gizmos.
>
> (Casey el al., 2016, p.7)

Individual teachers at the heart of each case came from different countries, and the resulting pedagogical cases were similar in style to the original model developed by Armour (2014). The narrative at the heart of the cases centred on an HPE teacher/practitioner who uses DigiTech. From this starting point, analyses were undertaken by academics from different disciplines, including pedagogy and, for the purposes of CPD, the teacher/practitioner was asked to conclude the chapter with their reflection on the analysis.

So what did we learn? Firstly, a critical review of all the pedagogical cases suggested that the term 'pedagogies of technology' can indeed be helpful in

foregrounding the ways in which individual practitioners 'do' something pedagogically different with technology. At the same time, and echoing the evidence presented earlier, we concluded that we saw very little in the cases that was genuinely radical or innovative. So, although many practitioners and scholars have positioned DigiTech as a kind of "supertool", we were struck by the lack of new forms of learning, different types of teaching, or indeed any alternative HPE contexts for learning. What we saw instead was that DigiTech enabled teachers and students to do the same things faster and more efficiently, albeit after some teachers had invested time and effort in learning how to use different technologies. We were left wondering whether what we saw in the cases was the limit of our imagination as a profession.

Some extracts from the practitioner reflections in the pedagogical cases are illustrative. Firstly, some teachers were unable to use DigiTech optimally in their practice because there was much they had never had the opportunity to learn – or had even considered as a learning possibility. For example, Dylan reflected "I would be interested in investigating the *lived experience* of students engaged in learning using the iPad" (Goodyear et al, 2016, p. 26). James commented: "Even though I consider myself a reflective practitioner, I had not connected my own professional journey to developments in technology… I have been taken back by the accuracy of the analysis from the academic experts and the amount of theory that highlights how and why these processes occur" (Chambers et al, 2016, p. 63). In another case, Beatrice noted that "in teaching it is important to take a critical look at pedagogies of technology and not think all teaching problems can be solved by technological solutions (Quennerstedt et al, 2016, p. 82) while Andy (Fletcher et al, 2016, p. 118) learnt that changing his mind about using DigiTech in an area of his practice "should not be looked at as a failure but as a strong example of sound pedagogical decision-making".

Indeed, the ambition to learn openly from 'mistakes' was a recurring theme. As was noted earlier, some practitioners appear willing to invest significant amounts of time in learning how to use and experiment with different forms of DigiTech, Joey is a good example of this (Gleddie et al, 2016, p. 134) and he was clear that he would be able to learn most effectively where he could share both his successes and his failures:

> I often share the "best" or in other words the refined or rehearsed version of what actually happened in my class. I receive digital pats on the back for my success, but I do not necessarily grow as a teaching professional as a result. To do that, I need to share the things that did not go as well in lessons and discuss what might have been missed opportunities in my teaching.

Secondly, following the practitioner narrative and the analysis from three different disciplinary perspectives, a pedagogy expert was tasked with locating the issues raised in a coherent pedagogical space. Pedagogues, however, struggled to do this in ways that opened up new and innovative pedagogical possibilities. For example, Castelli et al, (2016) drew on the established theories of problem-based learning as an analytical framework, Jones et al, (2016) (amongst others) used TPACK, Enright et al (2016) focussed on the privatisation of physical education – although they also include a section on 're-imagineering' HPE, and Armour et al (2016) drew on narrative theory and Deweyian concepts.

What we learnt through the process of constructing pedagogical cases, therefore, is that defining pedagogies of technology was helpful in framing the task for the pedagogical case author teams and encouraging them to think innovatively. Yet, the cases revealed remarkably little practice that could be regarded as radical as a direct result of using DigiTech to support learning. Instead, we have come to the

conclusion that while DigiTech should be able to "deepen and accelerate learning" (Fullan, 2013b, p 28) and enable teachers to do things "differently", we have missed out the prior-step of clarifying what is meant by "accelerating" learning in HPE, and *doing* things "differently". Essentially, the question for the profession is: what can we imagine for HPE?

Reflecting on the pedagogical cases process, we are able to offer a brief example of how an understanding of the benefits of DigiTech might be enhanced by pedagogical analysis. We draw again on the pedagogy framework of learners and learning, teachers and teaching and knowledge in context (Armour, 2011) mentioned earlier. In their pedagogical case chapter, Quennerstedt et al. (2016) used Armour's framework to consider Béatrice's use of dance video games in her teaching. Quennerstedt et al. (2016) argued, from a *learners and learning* perspective, that the key is not to consider how students are learning but *what* they are learning. They posed the question: "is the aim to learn different movement qualities, a particular dance, rhythm, dance moves, creativity, biomechanical or physiological principles? (Quennerstedt et al., 2016, p. 79). From this perspective, DigiTech is not a "gizmo" but a pedagogical intent to help learners learn. Secondly, in focussing on *teachers and teaching*, Quennerstedt et al. (2016) concluded that Béatrice used DigiTech as a teaching *resource* and emphatically not as a substitute teacher. Thus, the dance video game was described as "an instructor, a source of inspiration and a resource for students"(p. 79). In their consideration of *context*, Quennerstedt et al. (2016) challenged the reader to contemplate, from a cultural, historical and subject area perspective, why dance is taught at all; for example, is it "an activity, a cultural form, a form of exercise or an aesthetic practice and expression?" (p. 80). This level of analysis offers rich possibilities for teacher learning in CPD.

The remaining task for this paper, therefore, is to provide the rationale for our claim that we need to open a profession-wide debate about the nature of radical pedagogies in HPE that make optimal use of the potential capacity of DigiTech while minimising the potential harms. Looking back to earlier sections of this paper, a useful starting point is Lupton's (2015, p. 127) question:

> How far are we from a situation where "students are forced to wear heart-rate monitors to demonstrate that they are conforming to the exertions demanded of them by the HPE teacher?

An immediate reaction might be negative, given the dangers posed by a growing focus on performativity as outlined by Gard (2014) and many others in our field (Enright et al. 2016; Gleddie et al, 2016) and within education more broadly (Apple, 2007). There might, however, be another response.

In their individual and collective arguments about DigiTech, Gard, Lupton and Williamson suggested that DigiTech could offer more personalised and individualised learning opportunities. Building on this view, and using Lupton's example above of the heart rate monitor, we would like to argue that teachers could use DigiTech to monitor and tailor 'physical exertions' to the individual student and that this might be a very good thing. Indeed, it might be a better pedagogical strategy based on accurate individualised data that allows teachers to better meet the needs of each student. Although Gard, Lupton and Williamson suggested that such an approach could work to drive school improvement to the *exclusion* of teachers, it could also be argued that in the hands of skilful teachers, good data could be used to drive new and better forms of learning in HPE. Certainly, Hattie (2012, 2009), among others (e.g., Dinham, 2013) have argued that teachers who have the greatest impact on learning are those who can accurately diagnose and plan for the learning needs of their students. The

better the quality of the information a teacher has about a student, the more effective their pedagogies are likely to be. From this perspective, DigiTech has the potential to be an invaluable pedagogical device to support learning in individually and developmentally appropriate ways.

The problem, at this stage, is that we have not had a grand profession-wide debate that could inform our decisions about the use of DigiTech in HPE and its potential to change our practices for the better. A 'profession-wide' debate is not one that can rage in the pages of academic journals read mainly by other academics (Sandaña, 2014). As Sandaña (2014) suggests, if we keep doing this we will keep recycling the message of, "I got a different way of lookin' at it", and, in turn, the same pedagogical practices will most likely continue to exist. Instead, we 'all' need to 'jump on' the enthusiasm that DigiTech has in young people's lives and begin to co-construct new and exciting futures for HPE.

A profession wide debate would involve policy makers, businesses, health professionals, technology experts, teachers, students, parents, and the wider community. In other words, anyone who is a participant in, or invested in HPE. We know from existing evidence-base that exercising the voices of all key stakeholders in HPE is a powerful mechanism for diagnosing learners' needs, evaluating teachers and teaching, co-constructing new contexts for learning and creating effective practices within HPE (see Leatherdale et al., 2015, and Luguetti et al., 2015). We have been sensitised to the dangers of DigiTech in HPE by the ground-breaking work of Gard, Lupton, and Williamson yet, at the same time, their pessimistic views are somewhat 'zoomed out' from the realities of young people's digital lives. We have learnt from the pedagogical cases process that new futures are possible for HPE, but that the collaborations we facilitated between academics and practitioners highlighted a lack

of radical change in HPE. By opening these debates and questions about co-constructing new forms of HPE within the social and cultural framework of DigiTech, to a wider audience, however, we might generate discussions that can lead to improvements to HPE.

We conclude this paper by drawing on Veletsianos (2016) to suggest that a focus on "emerging technologies" and "emerging practices" in digital learning could be a useful way forward. As Veletsianos (2016) argues, "emerging technologies" and "emerging practices" transcend disciplines and, moreover, what makes practice and technology emerging is not the technology, but rather the environments in which technologies and practices operate. Emerging technologies and practices, therefore, are foregrounded in the belief that technologies and practices shape and are shaped by sociocultural environments. Another notable characteristic of emerging technologies is that while there is significant potential for change, such potential has not yet been realised. This final characteristic is the key message of this paper. The 'take home message' we want to provide is that DigiTech crosses multiple sectors (e.g., education, journalism, sport), multiple contexts (e.g., home and school), and can be used in multiple ways (e.g., improve learner-learner interaction or personalised learning). As an academic profession, therefore, we will do our young learners a disservice if we simply subscribe to a pessimistic view of the role of Digitech in HPE. As Velestianos (2016) argues, DigiTech is not yet established in education. This provides an opportunity for pedagogy experts to shape debate, pedagogy and practice around DigiTech in HPE, rather than allowing technology experts to claim the territory.

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